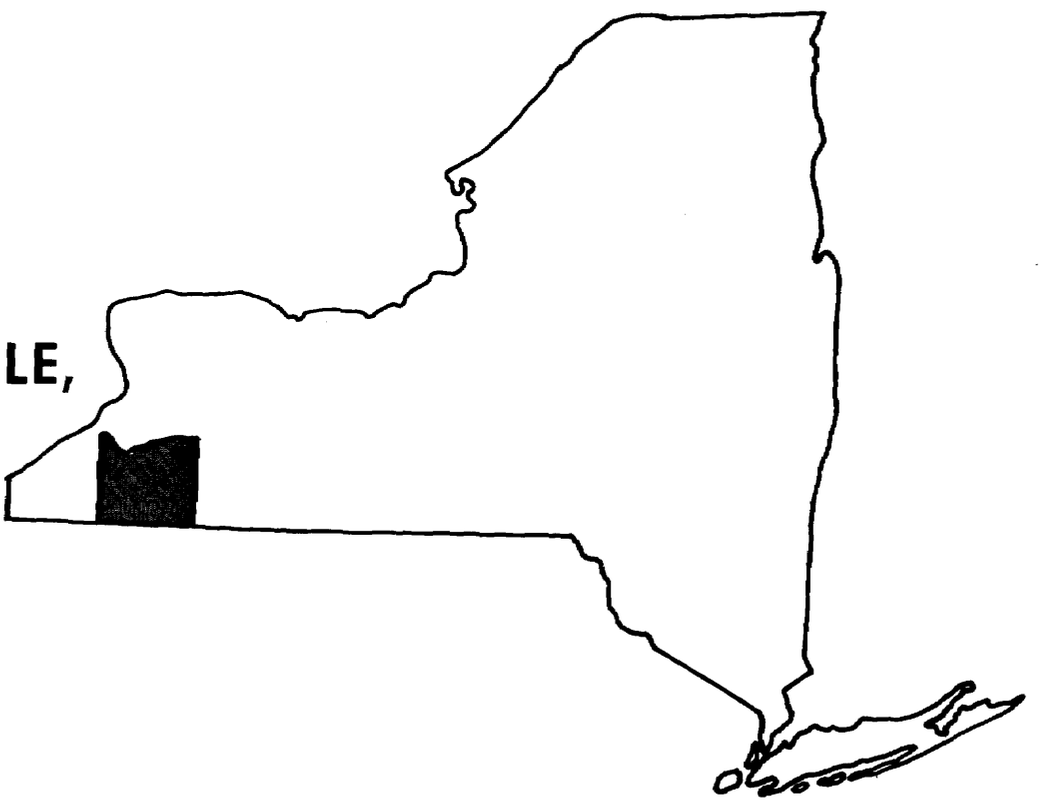
FLOOD INSURANCE STUDY



TOWN OF FRANKLINVILLE, NEW YORK

CATTARAUGUS COUNTY

JANUARY 1978

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

TABLE OF CONTENTS

TABLE OF CONTENTS - continued

FIGURES

TABLES

EXHIBITS

FLOOD INSURANCE STUDY
TOWN OF FRANKLINVILLE, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Town of Franklinville, Cattaraugus County, New York, and to aid in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the Town of Franklinville to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of this information will be made by local and regional planners in their efforts to promote sound land use, and flood plain development.

1.2 Coordination

The purpose of the Flood Insurance Study was explained at a meeting on July 31, 1975. In attendance at this meeting were representatives of the Town of Franklinville, the FIA, the Cattaraugus County Planning Board, the U. S. Department of Agriculture, Soil Conservation Service (SCS), the U. S. Army Corps of Engineers (COE), and the New York State Department of Environmental Conservation (the Study Contractor).

A search for basic data was made at all levels of government. The COE and the SCS provided information as well as copies of previously surveyed cross sections of Ischua and Gates Creeks which served as part of the input for the hydraulic analysis from which flood hazard reports were prepared. The U. S. Geological Survey (USGS) was contacted to obtain contour maps showing drainage boundaries. Information regarding flow data was not available from USGS since there are no existing flow records in the area.

On November 17, 1976, a meeting was held with officials of the town to obtain additional local input. The final Consultation and Coordination meeting was held on February 15, 1977, where the final draft of the Flood Insurance Study was presented for further local comment. The meeting was attended by representatives of the FIA, Town Board, Town Supervisor, Cattaraugus County Planning Board and interested citizens. No comments critical to the report were received at the meeting.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were performed by the New York State Department of Environmental Conservation for the Federal Insurance Administration, under Contract No. H-3856. This work, which was completed in March 1977, covered all the significant flooding sources in the Town of Franklinville.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the Town of Franklinville. The areas within the Village of Franklinville are excluded from this study. The area of study is shown on the Vicinity Map (Figure 1). The areas studied by detailed methods were selected with priority given to all known flood hazard areas, areas of projected development and proposed construction for the next five years, through March 1982. The selection of streams for detailed study was made jointly with community officials at the Time and Cost meeting. Floods caused by overflow of Ischua Creek and a portion of Gates Creek were studied in detail. Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by FIA. A small segment of Saunders Creek (approximately 200 feet) and several small streams through the town were studied by approximate methods.

2.2 Community Description

This Flood Insurance Study covers the area of the Town of Franklinville in the eastern part of Cattaraugus County in western New York State. It has an area of approximately 52 square miles and is bounded by the Towns of Ellicotville to the west, the Town of Machias to the north, the Town of Lyndon to the east and the Towns of Ischua and Humphrey to the south. In 1960 the population was 3,090 and in 1970, it decreased to 2,847 (Reference 1). The population has not varied significantly since 1900.

The area along the flood plains is primarily agricultural and rural non-agricultural. Although sparsely developed at the present time,

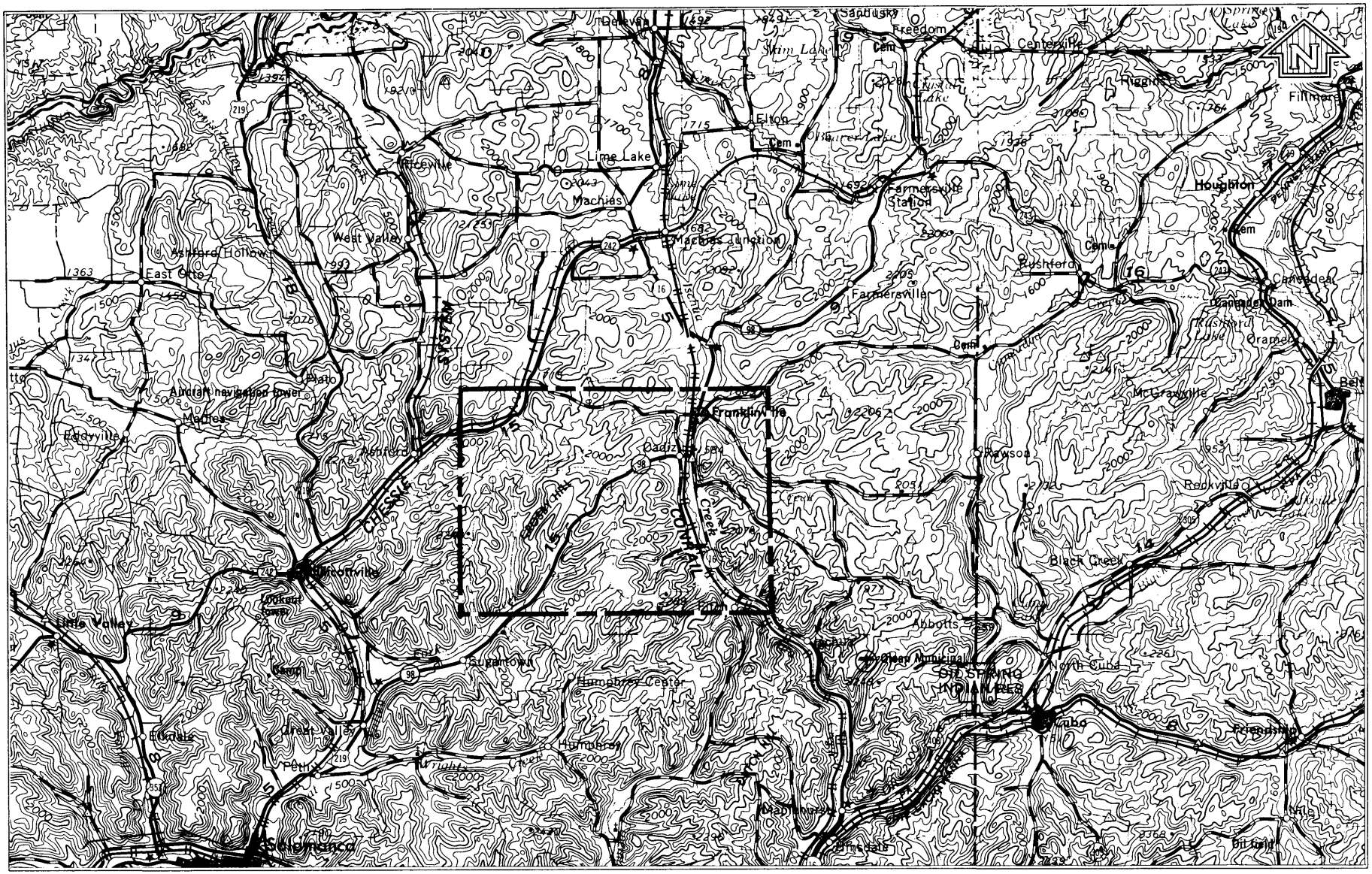


FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF FRANKLINVILLE, NY
(CATTARAUGUS CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

potential development is expected along the flood plain of Ischua Creek in the future.

The area is mostly hilly in the town, and the land is composed of maturely dissected plateaus designated as the Northwestern Appalachian Plateau Broder and the Allegheny Plateau. The soil ranges from gravelly loams to clay, but in most places it is a silty loam. Both the original and the present second and third growth forests were and are composed principally of Yellow Birch, Beech and Hard Maple. The wood lots are, for the most part, kept free of underbush by grazing animals (Reference 2).

Average annual precipitation is about 38 inches and the runoff, 20 inches. Average January and July temperatures are 25°F and 68°F, respectively (Reference 3).

Ischua Creek begins in the Town of Machias, north of the Town of Franklinville. It enters the Town of Franklinville on its northern border just north of the Village of Franklinville. After passing through that village, it flows in a southerly direction about 6.8 miles to the town's southeast corner where it passes into the Town of Ischua. Ischua Creek continues to the south into Olean Creek and joins the Allegheny River at Olean, New York. The Allegheny River joins with the Monongahela River at Pittsburgh to form the Ohio River. Gates Creek begins in the Town of Lyndon and flows into the Town of Franklinville at about the mid-point of the town's eastern boundary. Gates Creek flows through the town for about 4,000 feet then through the southeast corner of the Village of Franklinville and again through the town for some 3,000 feet to its confluence with Ischua Creek just south of the village.

Portions of the flood plains for Ischua and Gates Creeks are shown in Figures 2, 3 and 4.

2.3 Principal Flood Problems

The most frequent floods in the study area result from winter or spring rainfall, usually augmented by melting snow. Occasionally, flooding has been caused by ice jams.

There is no gaging station in this town. The maximum recorded flood on Gates Creek occurred September 28, 1967 with an estimated flow of 4,880 cubic feet per second (cfs) at the Village of Franklinville which has a drainage area of 19.3 square miles (Reference 4).

Figure 2 - Five Mile Road Bridge over Ischua Creek looking upstream.

Figure 3 - Cadiz Road Bridge (Route 98) over Ischua Creek looking upstream.

Figure 4 - Cadiz Road Bridge (Route 98) over Gates Creek looking downstream.

The Coal Chutes Road Bridge was completely covered by the flood of September 1967. The water-surface was about 1.0 foot below low steel during the flood of June 1972 (Reference 5).

2.4 Flood Protection Measures

The Ischua Creek Watershed project of the SCS has been authorized for development and is almost completed (Reference 6). This project covers 117 square miles around Franklinville. It includes five floodwater retarding structures and one multipurpose reservoir, along with one debris basin, channel improvements, stream protection and levees. The major purpose is to provide flood protection for agricultural land, and for residential and industrial properties.

Another structure having flood regulation effect is an earthen dam (SCS Water Retarding Structure #4) on Saunders Creek in the northeast corner of the Town of Franklinville. The spillway of the dam is at an elevation of 1,716 feet. This structure does not significantly lower the flood elevations in the Town of Franklinville.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and for flood insurance premium rates. The analyses reported here reflect current conditions in the drainage areas of the flooding sources.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail in the community.

A synthetic rainfall-runoff relationship method, based on a dimensionless unit hydrograph, was used to develop flood flow-frequency relationships. The 24-hour rainfall amounts for frequencies up to 100 years, as obtained from the Rainfall Frequency Atlas of the United States were plotted on log-normal paper and the rainfall amount for the 500-year frequency was extrapolated from the resulting graph (Reference 7).

The watershed of each stream was divided into subareas to evaluate the hydrologic effects of as many tributaries as would be significant.

The computer program TR-20, developed by the SCS, was used to compute surface runoff (Reference 8). It takes into account conditions affecting runoff such as land use, type of soil, shape and slope of watershed, antecedent moisture condition, etc. It develops a hydrograph and routes the hydrograph through stream channels and reservoirs. The program is designed to combine the routed hydrograph with those from other tributaries and print out the total composite hydrograph peak discharges, and times of occurrence at each desired point in the watershed for each storm evaluated. From this data frequency discharge, drainage area curves were plotted for each evaluation point.

A summary of discharges for the streams studied in detail is shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ISCHUA CREEK					
At Section A	97.4	4,700	6,400	7,000	8,700
At Section J	44.5	1,800	2,700	3,200	4,200
GATES CREEK					
At Upstream Corporate Limits (Village of Franklinville)	19.1	1,100	1,600	1,900	2,500

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flood sources.

Flood profiles on Ischua and Gates Creeks were calculated using the SCS WSP-2 water-surface profiles computer program (Reference 9). This program uses the standard step method, with some modifications, to compute profiles between valley sections. All profiles are computed in the upstream direction. Therefore, only subcritical flow, a condition normally characteristic of natural streams, can be analyzed. For any super-critical flows encountered the

program will assume critical depth and resume computations. At any one road restriction, WSP-2 can compute head losses through one bridge opening or up to five culvert openings with different configuration.

Reach lengths for the channel were measured along the centerline of channel between sections and overbank reach lengths were measured along the approximate centerline of the effective out-of-channel flow area.

Channel roughness coefficients (Manning's "n") were determined by field inspection and based on the National Engineering Handbook (Supplement B) (Reference 10). In arriving at a realistic value due weight was given to the natural materials the channel was composed of, surface irregularity, variations in shape and size of cross sections, characteristics of obstructions such as debris deposits, stumps, exposed roots, boulders, fallen trees, lodged logs, etc., type of vegetation, and degree of meandering. Roughness coefficients ranged from 0.045 to 0.06 for main channel and from 0.060 to 0.095 for overbank areas.

Cross sections for the backwater analysis of the streams studied in detail in this report were field-surveyed and were located at close intervals above and below bridges, at control sections along the stream length, and at significant changes in ground relief, land use, or land cover. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3). The frequency-discharge, drainage area relationships at each cross section were used to develop the corresponding stage-frequency relationships. Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals.

The identification of the approximate flooding reaches for the small streams in the town was done by field inspection and analysis of available topographic mapping.

All elevations used in this study for the town are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Elevation reference marks used for this study are shown on the maps.

Flood elevations may be raised by ice jams during spring thaws; the hydraulic analyses for this study, however, are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only if hydraulic structures in general remain unobstructed and dams and other flood control structures operate properly and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage State and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps developed for this study from aerial photographs at a scale of 1"=400' with a contour interval of 5.0 feet (Reference 11). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For Sanders Creek (studied by approximate methods), the 100-year flood boundary was obtained from an analysis of field inspections and the topographic maps referenced. Other streams studied by approximate methods had their 100-year flood boundaries taken from the Flood Hazard Boundary Map developed for the FIA by Gannet, Flemming, Corddry, and Carpenter, Inc. of Harrisburg, Pennsylvania (Reference 12).

The 100-year flood boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations, and, therefore, may not be subject to flooding. Owing to limitations of the map scale or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood carrying capacity, increases the flood heights of streams, and

increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented for this study were computed on the basis of equal conveyance reduction from each side of the flood plain by the HUD-15 Computer Program (Reference 13). The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 5.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each significant flooding source affecting the Town of Franklinville.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Ischua Creek							
A	550[1]	412	1,848	3.79	1,546.5	1,545.5	1.0
B	3,500[1]	451	4,360	1.56	1,551.5	1,550.5	1.0
C	8,850[1]	663	6,979	0.97	1,554.3	1,553.3	1.0
D	14,400[1]	747	5,431	1.25	1,555.0	1,554.0	1.0
E	16,650[1]	244	2,171	3.13	1,557.7	1,556.7	1.0
F	19,500[1]	516	4,017	1.69	1,558.6	1,557.6	1.0
G	29,700[1]	566	2,752	2.11	1,565.7	1,564.7	1.0
H	33,425[1]	110	1,258	3.18	1,571.0	1,570.0	1.0
I	35,000[1]	513	2,785	1.44	1,572.7	1,571.7	1.0
J	46,300[1]	631	2,351	1.36	1,589.2	1,588.2	1.0
Gates Creek							
A	500[2]	156	780	2.44	1,569.4	1,568.4	1.0

[1]FEET ABOVE CORPORATE LIMITS
[2]FEET ABOVE CONFLUENCE WITH ISCHUA CREEK

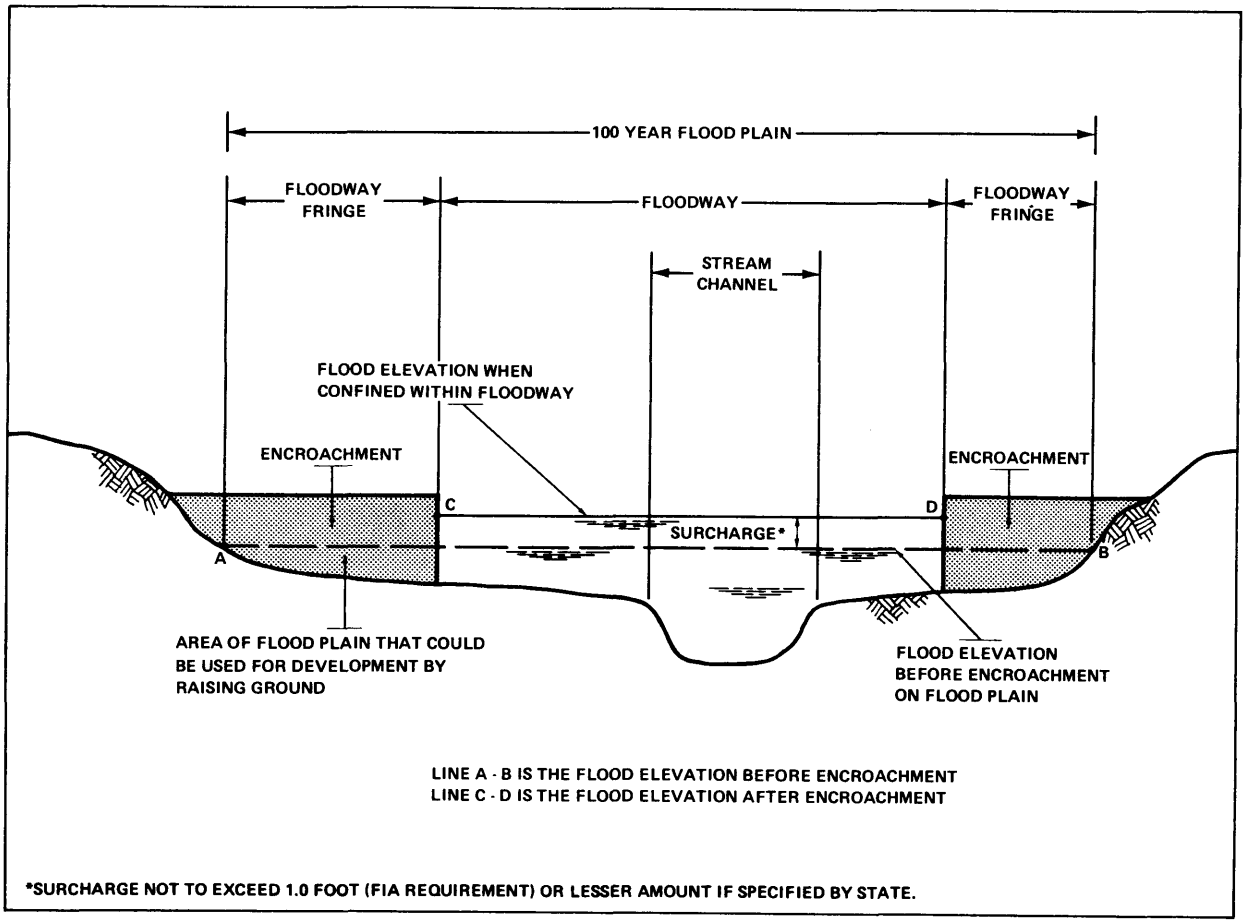
TABLE 2

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF FRANKLINVILLE, NY
(CATTARAUGUS CO.)

FLOODWAY DATA

ISCHUA CREEK AND GATES CREEK



FLOODWAY SCHEMATIC Figure 5

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations of the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot

Five reaches meeting this criteria were required to establish flood insurance zones for the Town of Franklinville. These include four reaches on Ischua Creek and one on Gates Creek. The locations of the reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damages from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference of water-surface elevations between the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHF, the entire incorporated area of Franklinville was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A3, A4, A6:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones assigned according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or, areas subject to certain types of shallow flooding where depths are less than 1.0 foot. Zone B is not subdivided.

Zone C: Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Franklinville is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineations of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

No other flood studies exist for the Town of Franklinville. Flood Insurance Studies are currently underway by the New York State Department of Environmental Conservation for other communities within the Allegheny Basin. Communities contiguous to the Town of Franklinville that are presently under study are the Village of Franklinville, Town of Ellicottville, Town of Ischua and Town of Great Valley (References 14 through 17, respectively). Hydraulic determinations have been coordinated to insure profile agreement between communities. This study is considered authoritative for purposes of the Flood Insurance Program and the data presented here either supersede, or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Federal Insurance Administration, Regional Director, 26 Federal Plaza, New York, New York 10007.

8.0 BIBLIOGRAPHY AND REFERENCES

1. New York State Legislative Manual, 1975.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Ischua Creek							
Reach 1	05	-2.2	-0.4	+0.9	020	A4	Varies
Reach 2	05	-1.3	-0.4	+0.7	015	A3	Varies
Reach 3	05	-2.2	-0.4	+0.6	020	A4	Varies
Reach 4	05	-3.0	-1.0	+0.5	030	A6	Varies
Gates Creek							
Reach 1	05	-2.2	-0.4	+0.7	020	A4	Varies

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO THE NEAREST FOOT–SEE MAP

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF FRANKLINVILLE, NY
(CATTARAUGUS CO.)

FLOOD INSURANCE ZONE DATA

ISCHUA CREEK AND GATES CREEK

2. U. S. Department of Agriculture, Soil Conservation Service, Generalized Soil Map of New York State, Cornell University Agricultural Experimentation, 1967.

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10. U. S. Department of Agriculture, Soil Conservation Service, National Engineering Handbook Section 4, Hydrology, Section 5, Hydraulics (Supplement B).

11. Lockwood, Kessler, Bartlett, Inc., Topographic Maps of the Town of Franklinville, New York, Scale 1"=400', Contour Interval 5 feet: Syossett, New York 1975.

12. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Franklinville, Cattaraugus County, New York, November 1976.

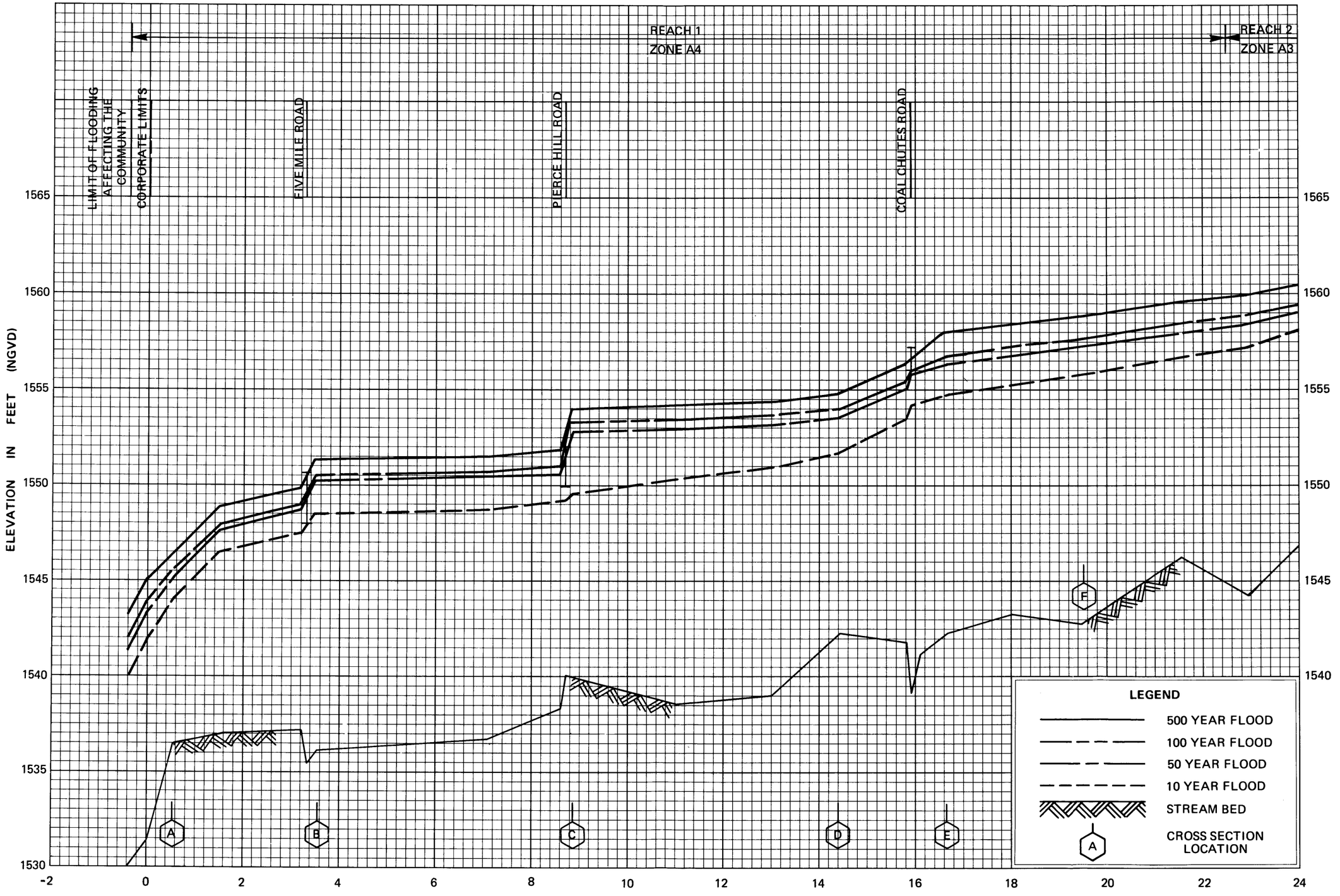
13. U. S. Department of Agriculture, Soil Conservation Service, HUD-15 Computer Program, Central Technical Unit, March 1974.

14. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Village of Franklinville, Cattaraugus County, New York (unpublished).

15. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Ellicottville, Cattaraugus County, New York, (unpublished).

16. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Ischua, Cattaraugus County, New York, (unpublished).

17. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Town of Great Valley, New York, (unpublished).



FLOOD PROFILES

ISCHUA CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF FRANKLINVILLE, NY
(CATTARAUGUS CO.)

01P

REACH 2
ZONE A3

REACH 3
ZONE A4

AREA NOT
INCLUDED

REACH 4
ZONE A6

CONFLUENCE OF GATES CREEK
CONRAIL
STATE ROUTE 98
CORPORATE LIMITS
CORPORATE LIMITS
CONRAIL
CORPORATE LIMITS

ELEVATION IN FEET (NGVD)

1600
1590
1580
1570
1560
1550
1540

24 26 28 30 32 34 36 38 40 42 44 46 48

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE CORPORATE LIMITS

G H I J

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

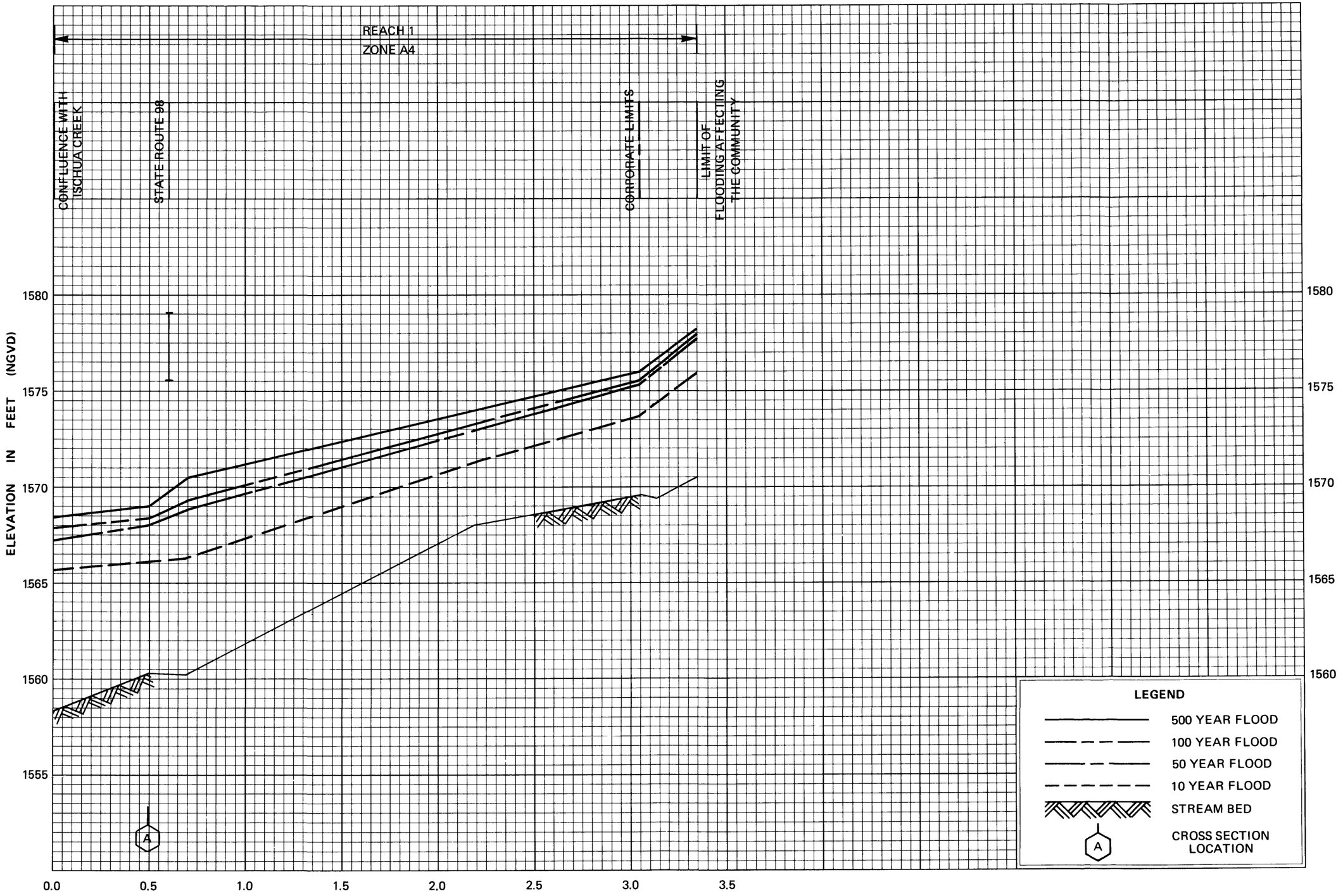
FLOOD PROFILES

ISCHUA CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF FRANKLINVILLE, NY
(CATTARAUGUS CO.)

02P



FLOOD PROFILES

GATES CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

TOWN OF FRANKLINVILLE, NY
(CATTARAUGUS CO.)

03P